

8. Environmental and Socioeconomic Impacts

The Kyoto Protocol exhorts Annex B parties, in fulfilling their obligations, to minimize negative social, environmental and economic impacts, particularly on developing countries (Articles 2.3 and 3.14).¹ Furthermore, one of the primary goals of the Clean Development Mechanism is sustainable development.² At this time, it is unclear on what indicators of sustainable development need to be addressed in the evaluation of energy-efficiency projects. Once there is an understanding of this, then MERVC guidelines for those indicators will need to be designed. At a minimum, energy-efficiency projects should meet current country guidelines for non-Clean Development Mechanism projects.

LBNL's MERVC guidelines for energy-efficiency projects include environmental and socioeconomic impacts for two additional reasons. First, the persistence of GHG reductions and the sustainability of energy-efficiency projects depend on individuals and local organizations that help support a project during its lifetime. Both direct and indirect project benefits will influence the motivation and commitment of project participants. Hence, focusing only on GHG impacts would present a misleading picture of what is needed in making a project successful or making its GHG benefits sustainable. Second, a diverse group of stakeholders (e.g., government officials, project managers, non-profit organizations, community groups, project participants, and international policymakers) are interested in, or involved in, energy-efficiency projects and are concerned about their multiple impacts. In the monitoring and verification forms (Appendices B and C), checklists are provided for developers, evaluators, and verifiers to qualitatively assess the impacts described in this section. These checklists are not exhaustive but are included to indicate areas that need to be assessed. Other existing guidelines are better suited for addressing these impacts: e.g., the World Bank has developed guidance documents for World Bank-supported projects (World Bank 1989). LBNL's checklists should help to improve the credibility of the project (by showing stakeholders that these impacts have, at least, been considered) as well as to facilitate the review of energy-efficiency projects.

¹ As defined in the Kyoto Protocol, Annex B countries are OECD countries and countries undergoing the process of economic transition to a market economy (UNFCCC 1997).

² In one definition, development is sustainable when it "meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987). In order to translate this general definition to specific applicable policies, a variety of definitions have appeared, sometimes serving different objectives and interest groups (see Makundi 1997; Michael 1992; O'Riordan 1988).

8.1. Environmental Impacts.

Energy-efficiency projects have widespread and diverse environmental impacts that go beyond GHG impacts. The environmental benefits associated with energy-efficiency projects can be just as important as the global warming benefits. Potential environmental impacts that need to be considered are presented in Table 12 (see also Box 14). Direct and indirect project impacts need to be examined, as well as “avoided negative environmental impacts” (e.g., the deferral of the construction of a new power plant). Both gross and net impacts need to be evaluated.

Table 12. Potential Environmental Impacts

Impact Category	Comments
Dams and reservoirs	Implementation and operation
Effluents from power plants	Air, water and solid effluents from power plants (e.g., City of Decin’s fuel switching for district heating project and Honduras’ bio-gen biomass power generation project; USIJI 1998)
Hazardous and toxic materials	Manufacture, use, transport, storage and disposal
Indoor air quality	Measures to maintain and/or improve indoor air quality (Community of Guguletu et al. 1998; Chen and Vine 1998)
Industrial hazards	Prevention and management
Insurance claims	Reduced losses in personal and commercial lines of coverage (Vine et al. 1998)
Occupational health and safety	Plans
Water quality	Protection and enhancement
Wildlife and habitat protection or enhancement	Protection and management

Source: Adapted from World Bank (1989).

At a minimum, developers need to describe the environmental impacts associated with the project.¹ In addition, the developer needs to identify any proposed mitigation activities to address the negative impacts. The filing of an environmental impact statement (EIS) is likely to help ensure the persistence of energy savings from energy-efficiency projects. Where applicable, developers need to indicate whether an EIS has been filed and that their response to the checklist in Table 12 is consistent with the EIS. In addition, developers need to indicate if any existing laws require these impacts to be examined.

¹ An issue that still needs to be resolved: does an investor abide by its country’s environmental laws, or must it abide, at a minimum, by the host country’s laws?

Box 14**Energy Efficiency and the Indoor Environment**

In developing countries, fuels are often burned in inefficient stoves, with inadequate, or in many cases, non-existent chimneys. The resulting indoor air pollution exposes families to particulates, carbon monoxide and other products of combustion. The costs of the failure to recognize the energy-development linkage is evident in the nations' health statistics. For example, one study found that black South African children are 270 times more likely to die from acute respiratory infection than west European children. In a more recent study, respiratory diseases across all age groups cost the South African Department of Health US \$75 million in treatment costs alone. In addition to these costs, there are productivity and quality of life losses which are more difficult to quantify, but could conceivably add up to tens of millions of dollars equivalent per year.

To address these problems, South Africa launched the Reconstruction and Development Program (RDP) which intends to provide the following services to South Africa's historically disadvantaged population: electricity, clean water, health services, education, economic advancement, and improved housing. Monitoring of the housing will include the collection of the following data: comfort levels in home (temperature measurements); indoor air quality (e.g., particulate matter, sulfur dioxide and carbon monoxide), health indicators for both children and adults (e.g., incidence of lung disease, mortality and morbidity rates, and health related expenditures per family), and safety indicators (e.g., incidence of fires, burn, and poisoning from kerosene usage; and economic costs of fires and burns).

Source: Community of Guguletu, PEER Consultants, P.C., and International Institute for Energy Conservation. 1998. "Housing for a Sustainable South Africa: The Guguletu Eco-Homes Project," USIJI Project Proposal. Washington, D.C.: International Institute for Energy Conservation.

At a minimum, evaluators need to review the checklist of environmental impacts and the EIS, if available. Evaluators need to collect some minimal information on potential impacts via surveys or interviews with key stakeholders. The evaluator should also check to see: (1) whether any existing laws require these impacts to be examined, (2) if any proposed mitigation efforts were implemented, and (3) whether expected positive benefits ever materialized. Evaluators may want to conduct some short-term monitoring to provide conservative estimates of environmental impacts. The extent and quality of available data, key data gaps, and uncertainties associated with estimates should be identified and estimated.

The information collected and analyzed by evaluators will be useful for better describing the stream of environmental services and benefits of a project, in order to attract additional investment and to characterize the project's chances of maintaining reduced GHG emissions over time. This information will, hopefully, also help in mitigating any potentially negative environmental impacts and encouraging positive environmental benefits.

8.2. Socioeconomic Impacts

A project's survival is dependent on whether it is economically sound: i.e., the benefits (including the value of carbon) outweigh the costs and are equitably distributed. Developers could use one or more economic indicators for assessing the economics of energy-efficiency projects: e.g., cost-benefit ratio, net present value, payback period, rate of return on investment, or dollars per ton of carbon emissions reduced. These indicators could be calculated from different perspectives (e.g., government, investor, and consumer), and all assumptions (e.g., lifetime, discount rate, project costs) should be identified. In addition, the distribution of project benefits and costs needs to be evaluated to make sure one population group is not being unduly affected (equity impacts).

In constructing these indicators, the developer should also consider possible macro-economic impacts from the project: e.g., gross domestic product, jobs created or lost, effects on inflation or interest rates, implications for long-term development, foreign exchange and trade, other economic benefits or drawbacks, and displacement of present uses.

In examining socioeconomic impacts, developers and evaluators need to ask the following questions: who the key stakeholders are, what project impacts are likely and upon what groups, what key social issues are likely to affect project performance, what the relevant social boundaries and project delivery mechanisms are, and what social conflicts exist and how they can be resolved (World Bank 1994). To address these questions, developers and evaluators could conduct informal sessions with representatives of affected groups and relevant non-governmental organizations.

The need to analyze social factors that influence a project continues throughout the entire life of a project. The evaluation of the social dimensions of a project is called a social analysis or social impact assessment (Asian Development Bank 1994). The social analysis typically includes an assessment of the benefits to the clientele participating in the project (e.g., does the project meet their needs), their capability to implement the project (e.g., level of knowledge and skill and capabilities of community organizations), and any potential adverse impacts on population groups affected by the project (e.g., involuntary resettlement, loss of livelihood, and price changes).

During the project development stage, projects are approved if they are consistent with the general development objectives of the host country, in terms of social and economic effects (Table 13). Both gross and net impacts need to be evaluated.

Table 13. Socioeconomic Impacts

Impacts
Cultural properties (archeological sites, historic monuments, and historic settlements)
Distribution of income and wealth
Employment rights
Gender equity
Induced development and other sociocultural aspects (secondary growth of settlements and infrastructure)
Long-term income opportunities for local populations plants (jobs) (e.g., City of Decin's fuel switching for district heating project plants (e.g., City of Decin's fuel switching for district heating project and Honduras' bio-gen biomass power generation project; USIJI 1998); USIJI 1998)
Public participation and capacity building
Quality of life (local and regional)

Source: Adapted from World Bank (1989) and EcoSecurities (1998).

After a project has been implemented, MERVC activities should assess whether the project led to any impacts and whether any mitigation was done. Direct and indirect project impacts need to be examined, as well as “avoided negative socioeconomic impacts” (e.g., the preservation of an archaeological site as a result of the deferral of the construction of a new power plant).

Developers need to indicate whether their project will have one or more of these socioeconomic impacts and, where appropriate, describe the type of impact. In addition, the developer should identify any proposed mitigation activities to address the negative impacts and that may lead to positive impacts.

Evaluators need to review the checklist of socioeconomic impacts and should collect some minimal information on potential impacts via surveys or interviews with key stakeholders. The evaluator should also check to see if any proposed mitigation efforts were implemented and whether expected positive benefits ever materialized. The extent and quality of available data, key data gaps, and uncertainties associated with estimates may need to be identified and estimated.